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The Corner: Tectonic Intersections of the Architectural Environment

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Abstract

Architectural corners serve as nodes of constructional shifting, of structural logistics, of environmental control emphasis, of spatial experience, and of aesthetic considerations and it is in these particular building intersections that our greatest architects have exceled. Despite the importance of the corner, most architectural software introduces generalizations into design work that all but assures improper understanding of a building's corners, especially for students and those novice to the profession. The transformations undertaken in the computer rarely reflect the strategies used to create physical, occupiable space. For instance, when working in building information modeling software, walls intersect via "butt" or "miter" techniques regardless of the materiality of the components. Any system can turn the corner with perfect resolution, without the need for additional components or finishes typically used to resolve aesthetic and performance issues. From this technical perspective, what is possible in the computer is often impossible in reality.

This presentation centers on a recently initiated, seminar-based research project through which a group of upper division and graduate architecture students are rigorously examining a set of precedents in an effort to better understand how significant architects of the 20th and 21st centuries treated or continue to treat, as the case may be, the architectural corner in their critically acclaimed works. The primary goals of this study are to absorb for configuring these junctures of construction, tectonics, and design potential and to create a framework of lessons, which students can use in the development of their own design work moving forward both in the academy and in the professional world.

Keywords: Materials + Construction Techniques; Architectural Tectonics; Architectural Detail

Acknowledgements

We would like to acknowledge the hard work of all of the students who participated in this course in the Spring and Fall semesters of 2018. Specifically, Professor Schwartz would like to comment Ashley Brunton (study of the works of Louis Kahn) and co-authors Jaasiel Duarte-Terrazas (study of the works of Peter Zumthor) and Nataani Garnenez (study of the works of Fay Jones) for their contributions to this line of inquiry.

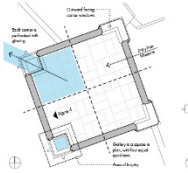


Figure 1: Plan Geometry
The gallery sits on the west side of the museum and is square in plan.

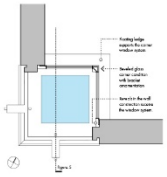


Figure 2: Corner Plan
The corner of inquiry houses a large window with inset glass that occupies the top half of the wall.

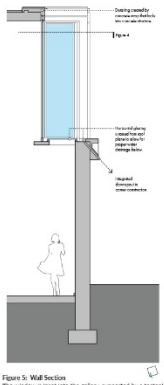


Figure 5: Wall Section
The window is inset into the gallery, supported by a tectonic frame.

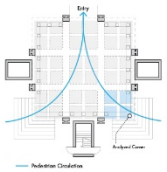


Figure 6: Plan Geometry
The unit was divided into nine 16' x 16' sections which were then broken down further into 8' x 8' sections.

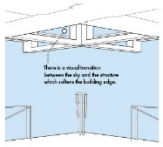


Figure 7: Perspective View Towards Entry
Opening the corner creates an illusion of lightness in the structure above.

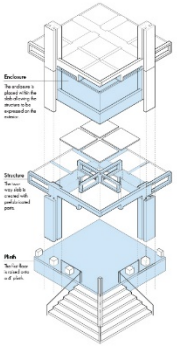


Figure 9: Exploded Axonometric of the Corner
The enclosure is placed within the structure which is then offset from a plinth.

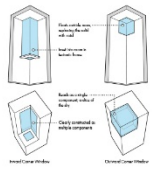


Figure 3: Corner Comparison
There are two types of corner windows in the gallery, one inset and one outset.

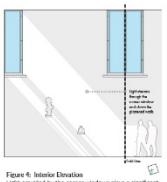


Figure 4: Interior Elevation
Light provided by the corner windows plays a significant role in the quality of the gallery space.

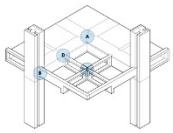
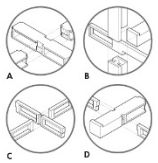


Figure 8: Corner Assembly
The prefabricated structure is assembled by four different connections.



Addition to the Gipsoteca Canoviano

Carlo Scarpa | 1955-1957

In 1955, Carlo Scarpa was commissioned to design an extension to an existing 19th century gallery space housing a collection of work by late 18th century Italian sculptor Antonio Canova. The museum had outgrown its existing home and the collection required more display space. The newly conceived museum was "founded in the practical necessity of augmenting the permanent exhibition space of the existing galleries [while also] amplifying and rationalizing the display of this unrivaled surviving collection" of Canova's sculpture.[1]

The corner under investigation here is located in the taller, square gallery, which is raised a single step from the entry gallery and is twice the height of that previously occupied space. The proportions of this room are derived from those of Canova's studio space, turning the master's workspace on end, but maintaining the dimensions of the space.[2] Here, "the form and position of the openings were derived directly from an attempt to 'cut out the blue of the sky.'"[3] The glass corners of the room are of two types, those that replace the wall and ceiling surfaces with glazing and those that are incised into the room. Scarpa imagined these two typologies as blocks of light, providing natural illuminance from above for the sculpture within. "Positioned at each of the upper corners of the cube, [these] rectangles in two matching pairs allow the sky with its moving clouds to illuminate the gleaming white volume of the gallery."[4] Our study focuses on the taller pair of windows, those incised into the gallery. The frames of the windows are iron and the windows are supported by a thin plaster shelf which bestows on the space "a greater architectonic feeling than apparent in their counterparts."[5]

Notes

[1] Judith Carmel-Arthur and Stefan Buzas, "Canova and Scarpa in Possagno," in Four Museums, ed. Axel Menges and trans. by Michael Robinson (London: Edition Axel Menges, 2004), 8.
[2] Robert McCarter, Carlo Scarpa (New York: Phaidon Press, 2018), 110.
[3] Guido Beltramini and Italo Zannier, eds., Carlo Scarpa: Architecture and Design (New York: Rizzoli International Publications, Inc., 2007), 114.
[4] Carmel-Arthur and Buzas, "Canova and Scarpa in Possagno," 14.
[5] Ibid.

Richard's Medical Research Laboratory

Louis Kahn | 1957-1961

Richard's Medical Research Laboratory is located in Philadelphia, Pennsylvania and was completed in 1961. This building was intended to house biology laboratories for the University of Pennsylvania. It was one of Kahn's first projects, which permitted him to put his set of architectural ideas to work. To create an efficient building for laboratories, Kahn imagined a structure that would be appropriate for this type of a facility and allow the laboratories to be open, flexible, and free of structural intrusions.

To solve this problem, Kahn introduced thick floor plates that provided ample space for systems and advancing technologies. Mechanical units and service spaces were then placed in brick towers as to not disturb the open floor plan. Kahn wrote, "The nature of space is further characterized by the minor spaces that serve it. Storage rooms, service rooms and cubicles must be given their own structure."[1] Though the brick towers may appear to be supporting the floor plates, this is a mind game intentionally facilitated by Kahn in the design of the facility. The two columns flanking the brick tower are the actual structure for the floors. The actual structure looks so small in comparison to the large brick towers that it creates an illusion of lightness.[2]

The entry sequence of Richard's Medical Research Laboratory is unique. Kahn intended for users to enter on the corner, luring users between the brick towers. People then walk up the stairs, onto a plinth, and are invited in by the articulation of the structure at the corner. Kahn chose a prefabricated concrete structure which is comprised of four different units. This strategy allowed the building to be built efficiently. To support the idea of lightness in the composition, Kahn opened the corners, creating a cantilevered structure. The floor plates themselves get smaller at the corners to reduce visual loads.

Notes

[1] Kahn, "Architecture is the Thoughtful Making of Spaces," Perspecta, no. 4 (1957): 2.
[2] Joseph Rosa, Louis I. Kahn: 1901-1974 Enlightened Space (TASCHEN, 2006), 87.

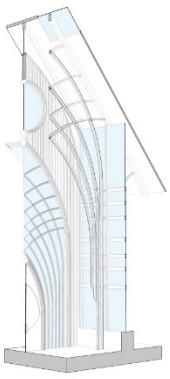


Figure 12: Corner Perspectives
View of corner from interior of nave.

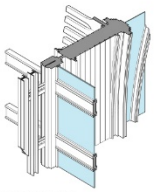


Figure 10: Corner Detail
The complex construction and attention to detail allows structure, envelope, and ornamentation to be woven together.

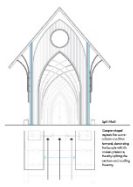


Figure 11: The Split Motif
The bipartition of the facade is split by the dominating columns found at the corner.

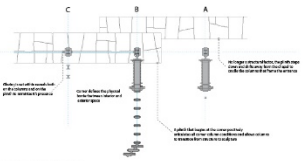


Figure 13: Plan Relationships
Details of the corner's plan geometry and the engagement of its tectonic components

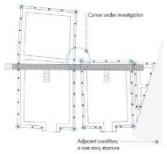


Figure 14: Plan Relationships
Repetitive motif of corner of interest, and moment of study.

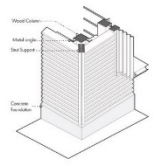


Figure 15: Corner Axon
Relationship between the components that make up the museum's corner structure.

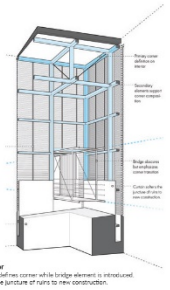


Figure 16: Interior
Timber structure defines corner while bridge element is introduced. Curtain softens the juncture of ruins to new construction.

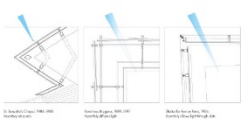


Figure 17: Comparithe Corners
Comparing the corner configuration and transparency of three of Zumthor's projects

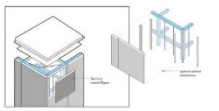


Figure 18: Peel Back Reveals Anatomy
Revealing Figure affords an understanding of the desired transparency and lightness.

Mildred B. Cooper Memorial Chapel

Fay Jones | 1986-1987

As two Mozart sonatas may share a three-part musical framework yet vary in key and ultimately in kind, the Mildred B. Cooper Memorial Chapel explores, expands, and transposes the Gothic theme introduced at Thorncrown Chapel. Cooper Chapel, commissioned by the children of Mr. and Mrs. John Cooper, Sr., in honor of the late Mrs. Cooper, is set in a dense grove on a hill above the 7,000-person community of Bella Vista, Arkansas.[1] Often called the little sister of Thorncrown, the Mildred O. Cooper Chapel utilizes strong repetitive elements in the structure of the design. Jones composed, again in harmony with the natural surroundings, a wood and steel structure exploring a unique perspective on the design theme of Gothic architecture. The entrance to the chapel rises from a stone floor and organically frames the entrance with a Gothic arch. Above floats an oculus giving visitors a glimpse of the chapel's signature steel work. To the sides of the chapel the columns splay out to support the roof, reminiscent of the flying buttress of Gothic cathedrals.

Although heavier in facade composition, Cooper Chapel recreates the light and delicate feel of Thorncrown within the walls of the nave. Best steel members, painted a soft bronze hue, grip each other like the interlocked fingers of two hands.[2] Steel columns, encapsulated in wood cladding, reach out through reveals to anchor the structure to the ground. This move is reflected on the exterior as well, where it supports the delicate roof structure.

The chapel, sitting gracefully in its natural environment, creates a cradle at its entry with a dove that is recessed underneath the archway. This configuration provides a smooth transition between exterior and interior. Jones uses these different sets of column types, referred to as A, B, and C in the diagram above, which are organized differently at the chapel's entrance, nave, and altar. The corner under investigation is a B-column type that features elements from both A and C-column types. Occurring at this corner is a transition from a heavy facade, anchored to the ground, to a light and airy glazing system that allows the natural environment to have a strong presence within the chapel walls.

Notes

[1] Ivy, Robert Adams., and Fay Jones. Fay Jones: The Architecture of E. Fay Jones, FAIA. New York, NY: McGraw-Hill, 2001.
[2] Ibid.

Shelter For Roman Ruins

Peter Zumthor | 1986

There was an almost unquestionable desire to preserve all that was left of two Roman Masonry structures in the town of Chur, Switzerland, two ruins which had, for quite some time, gone untouched and were on the brink of being lost. Zumthor's intervention, conceived as a sort of abstract reconstruction of what had been, is described as "a lightweight framework of walls, made of timber lamella which admit light and air, exactly follow[ing] the roman outer walls."[1]

The newly defined confines of the interior, therefore, allude to those of the Roman ruins. Once more, the location is given a visible form upon which light, air, and the sound of the town can permeate. At night, the ruins are given a new life, as the structures transform and become a lantern in the city.

One enters atop a modern steel foot bridge, not from the perceived archaic remains of the Roman entrances, which instead act as windows into and out of the protected space. The entry leads to an elevated observation level, one of many simple gestures aiming to preserve the ruins and not disturb them. This walkway allows one to walk along "a path through dark connecting tunnels from one spatial unit to another."[2] A literal piercing of the newly erected wooden wall sets the segmented and articulated procession in motion with points of release through the use of stairs that lower and reinsert the ruins to provide moments to engage with the ruins as they were. The area of inquiry is located at one of these piercings along the main walk, where the foot bridge engages with the corner of one of the wooden shells.

In this place, one can sense the city and experience life as it was before simultaneously. "You are steeped in history and you hear the city of the present."[3]

Notes

[1] Peter Zumthor, "Protective Housing for Roman Archeological Excavations, Chur, Graubunden 1985-86" Peter Zumthor Works: Buildings and Projects 1979-1997 (Lars Muller Publishers, 1998): 30.
[2] Ibid.
[3] Peter Zumthor "Peter Zumthor 1985-2013. Vol. 1" (Verlag Scheidegger and Spiess, 2017): 28.

The Corner

Tectonic Intersections of the Architectural Environment

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"...corners and walls are mutually dependent on each other for the definition of a space. It is the corners which make the space a figure; it is the corners which tell us where we are."[1]

In order to create enclosure, and architectural space in general, the primary systems of a building must turn, they must wrap, and eventually they must return to where they began. This fundamental precept of building is essential to the creation of space, but the moments of change, of intersection, of shifting that we define as corners are often overlooked – especially in academia – as critical to the functional performance, aesthetic appearance, and conceptual understanding of the built environment. When a wall, or any other construction system, turns and a corner is formed and a complex (sometimes significantly complex) situation is created. Corners serve as nodes of constructional shifting, of structural logistics, of environmental control emphasis, of spatial experience, and of aesthetic considerations and it is in these particular building intersections that our greatest architects have excelled.

The catalyst for this examination of the architectural corner is found embedded in the contemporary design process of the vast majority of those in the architectural profession. Utilized both in academia and in the professional world, most architectural software introduces generalizations into design work that all but assures improper understanding of a building's corners, especially for students and those novice to the profession. Although encompassing a larger range of issues, in the generation of architectural schemes, we utilize modeling programs that require us to shift from point, to line, to plane, and to volume, but the transformations undertaken in the computer rarely reflect the strategies used to create physical, occupiable space. When working in building information modeling software, walls intersect via "butt" or "miter" techniques regardless of the materiality of the components. Layers of walls can be "wrapped" at the ends, again regardless of material or structural makeup. Any system can turn the corner with perfect resolution, without the need for additional components or finishes typically used to resolve aesthetic and performance issues. From this technical perspective, what is possible in the computer is often impossible in reality, potentially leading the novice student or architect to improperly consider a building's corners, satisfied with the level of resolution provided by the computer.

This presentation centers on a recently initiated, seminar-based research project through which a group of upper division and graduate architecture students are rigorously examining a set of precedents in an effort to better understand how significant architects of the 20th and 21st centuries treated or continue to treat, as the case may be, the architectural corner in their critically acclaimed works. Each student participating in the seminar selected an architect to spend the semester examining and, from this particular architect, three corners from three different buildings to be the focus of the study. The semester was then spent creating an analysis of each of these three corners. From this analysis, the students produced a series of diagrams and other drawings that demonstrate how the corners of the buildings work with respect to structural, construction, assembly, enclosure, performance, aesthetic, spatial, and conceptual considerations. A model of one corner was created as a final course submission. Components of four of these corner analyses are presented above.

The primary goals of this study are to dissect these junctures of construction, tectonics, and design potential and to create a framework of lessons, which students can use in the development of their own design work moving forward both in the academy and in the professional world.

[1] Thomas Thiis-Evensen, *Archetypes in Architecture* (Oslo, Norway: Scandinavian University Press, 1997), 121.

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